

NEW KEY TO OAHU CYRTANDRA (GESNERIACEAE)

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As a result of twenty-five years of field and herbarium studies of Cyrtandra, St. John (1966) published a monograph of the Oahu species. These totaled 118 species, 7 varieties, and 1 forma. Since then, other botanists have discovered only a single additional species. Most of the species occur in wet forests, often near waterfalls, and these habitats are reached only after a descent into a steep valley head and a laborious climb out of it on the return hike. Now a new botanist, Wayne C. Takeuchi, has developed an interest in the genus, and during three years has searched in little known valley heads, and has discovered 35 species and one variety new to science. These are being published by St. John & Takeuchi in 1988. One was from the Waianae Mts., but all the others were from the Koolau Range. To assist botanists who observe and collect Cyrtandra, the following new key is presented.

- Calyx fusiform, especially in bud, splitting distally, deciduous from fruit; leaves opposite or verticillate.
- Section 1, subgenus Cyrtandra. See Part 1.
- Calyx mostly ovoid in bud, soon campanulate or crateriform, persistent, leaves opposite. Section 2, subgenus Brachycyathus. See Part 4.

Section 1, subgenus Cyrtandra

Part 1 (Calyx fusiform, deciduous)

1. Bracts connate around the buds; berry 4-12 cm long, cylindric,
2. Calyx 23-37 mm long, the beak 3-16 mm long,
3. Leaves whorled, 3-4 at a node; calyx upper lobes 13 mm long, corolla lobes glabrous without; floral bracts distinct,
4. Cymes 1-3-flowered; peduncle 1-3 mm long; bracts 18-33 mm long, connate. C. calpidicarpa, var. calpidicarpa.
4. Cymes 4-5-flowered; peduncle 14 mm long; bracts 7-10 mm long. var. distincta.
3. Leaves 2-3 at a node,
5. Leaves 2-3 at a node; calyx 25-30 mm long, beak of bud 3 mm long, corolla pilose striped C. brevicornuta.
5. Leaves opposite; calyx 35 mm long, pilosulous; beak 6 mm long; corolla glabrous. C. infundibuliformis.

2. Calyx 40-62 mm long, densely brown pilose, the beak 20-24 mm long, hornlike, not splitting; corolla 40 mm long, cymes 1-flowered; leaves 4 verticillate. C. cornuta.
1. Bracts free; berries less than 4 cm long, mostly ovoid or ellipsoid,
6. Leaves opposite. See at no. 6, Part 2.
6. Leaves whorled, mostly 3-5 at a node,
7. Leaves sessile or subsessile. See at no. 7, Part 2.
7. Leaves obviously petioled,
8. Corolla tube glabrous without,
9. Calyx glabrous or at anthesis glabrate,
10. Peduncles 2-15 mm long; bracts lanceolate,
11. Calyx lobes subulate acuminate,
12. Calyx 15-17 mm long, appressed villous; cymes 3-5-flowered; corolla 22-25 mm long; leaf surface glabrous below, the blades 2.2-4.8 cm wide. . . C. hyperdasa.
12. Calyx 31-33 mm long, sparsely puberulous; cymes 9-15-flowered; corolla 39 mm long; leaf surface appressed puberulous below, the blades 7-8.7 cm wide. . . C. triens.
11. Calyx lobes acute; calyx 22-25 mm long; corolla 28-33 mm long; leaves in 4's. C. nubincolens.
10. Peduncles 20-50 mm long; bracts ovate, 20-30 mm long. . . C. grandiflora, f. verticillata.
9. Calyx more or less pubescent in anthesis,
13. Calyx in anthesis entire, the apex a single horn-like beak; calyx shaggy brown villous,
14. Calyx splitting after anthesis into 3 lanceolate lobes. C. fusiformis.
14. Calyx beak entire; leaves whorled,
15. Calyx pilosulous; leaves in whorls of 3 to 4 on main branches, but opposite on small lateral ones,
16. Main blades in 3's and 5-14 x 2.3-4.3 cm. C. waiomaoensis.
16. Main blades in 3's or 4's and 14-37 x 3.3-10.7 cm. C. oblanceolata.
15. Calyx shaggy villous. . . C. degenerans.
13. Calyx in anthesis lobed into 3 or more teeth,
17. Well developed blades 7-10 cm wide; pistil glabrous. C. oblanceolata.
17. Blades 1.3-6 cm wide,
18. Calyx evenly pubescent,
19. Calyx in anthesis sparsely pilose; ovary pilose. C. latebrosa.
19. Calyx in anthesis shaggy villous; ovary glabrous. . . . C. calycoschiza.

18. Calyx closely hirsute at base, very
remotely so or glabrous above.
. C. nubincolens.
8. Corolla more or less pubescent without; calyx
glabrate to tomentose. See Part 2.

Part 2.

20. Calyx fusiform and beaked, not unequally 5-lobed at
anthesis.
21. Leaves (3-) 4-6 in a whorl; blades narrowly
elliptic or linear-oblongate,
22. Calyx densely villous; corolla tube sparsely
pilose below throat; ovary glabrous.
. C. calycoschiza.
22. Calyx appressed pilose, then subglabrate;
corolla tube funnelform, more or less hirsute
without; ovary sparsely pilose. C. latebrosa.
21. Leaves 3-4 in a whorl; blades broadly elliptic,
23. Calyx permanently shaggy pilose; corolla tube
cylindric, shaggy villous without; ovary
minutely glandular dotted or puberulous;
petioles shaggy villous. . C. ellipticifolia.
23. Calyx appressed pilosulous at base, sparsely
so above it; corolla tube funnelform, pilose
without on a few spots; ovary glabrous,
24. Petioles sparsely spreading pilosulous;
leaves of main branches in whorls of 3. . .
. C. perstaminodica.
24. Petioles appressed pilose; leaves of main
branches in whorls of 3-4. . C. oblongeolata.
20. Calyx in anthesis campanulate, subequally 5-lobed,
25. Blades oblongate,
26. Style glabrous; calyx villous within; corolla
deflected at middle at 15°. . C. megastigmata.
26. Style hirsute or pilosulous,
27. Calyx lobed 2/3 way,
28. Calyx 22-26 mm long, the tube 8-9 mm long,
the lobes lanceolate; corolla 20-23 mm
long, at middle deflected at 40°, the
upper lobes 7-8 mm long; leaf scars
connate. C. ternata.
28. Calyx 7 mm long, the tube 3 mm long, the
lobes subulate; corolla 15 mm long, the
tube straight; upper lobes 2 mm long; leaf
scars separate. C. trinalis.
27. Calyx lobed 2/5 way to base,
29. Lower calyx lobes broadly obliquely
lance-deltoid; calyx 26 mm long, glabrous
within; leaf scars distinct; blades
1.7-4.5 cm wide. C. Garberi.

29. Lower calyx lobes obliquely lanceolate; calyx 37 mm long, densely pilosulous within; blades 5-9 cm wide. . . C. subrecta.
25. Blades broadly lanceolate or broadly elliptic,
30. Style nearly glabrous, not glandular,
31. Calyx 15 mm long, puberulous, the lobes 5-7 mm long; corolla 24 mm long; blades elliptic; young shoots puberulent. C. deorsa.
31. Calyx 26 mm long, pilose, the lobes 16-17 mm long, corolla 30 mm long; blades broadly elliptic subacuminate; young shoots subappressed hirsute. . . C. caudatisepala.
30. Style capitate glandular-puberulent or -pilose; calyx shorter than the corolla tube,
32. Pedicels spreading pilose; corolla 35 mm long, spreading white villous; petioles and leaf veins below spreading pilose; peduncles about 15 mm long; petioles and blades with veins below rusty pilose. . . C. plurifolia.
32. Pedicels appressed brown villous, corolla 25-32 mm long, glandular pilosulous; petioles and blades with veins below appressed brown villous; peduncles 3-5 mm long. C. crenata.
7. Leaves sessile or subsessile,
33. Leaves sessile, auriculate at base, oblanceolate, gradually narrowing to a broadly winged base, corolla glabrous without; style glabrous. C. sessilis.
33. Leaves subsessile, narrowly oblanceolate, crenate, abruptly narrowed to a long cuneate slender base,; corolla pilose without, style pilosulous. C. Garberi.
6. Leaves opposite,
34. Cymes many-flowered (7-25 or more); leaves sessile or subsessile, 30-60 cm long,
35. Calyx villous without, subcylindric, cymes axillary; stigmas narrowly elliptic, distinct, divergent; leaves broad based, sessile or subsessile. C. waianuensis.
35. Calyx lobes glabrous without; calyx at length campanulate; stigma obcordate; blades cuneate tapering at base; flowers on lower naked stems or upper roots. C. kaulantha.
34. Cymes few-flowered, usually less than 7-flowered (occasionally to 12-flowered); leaves petiolate, usually less than 25 cm long. . . . C. megistocalyx.
36. Corolla glabrous without,
37. Peduncles 1-15 mm long; bracts 4-11 mm long,
38. Pedicels glabrous; calyx 7-14 mm long in bud,

- glabrous, campanulate, the lobes subequal,
1-1.5 mm long. C. brevicalyx.
38. Pedicels pubescent,
39. Pedicels ascending puberulent; calyx 23-28
mm long; corolla 35 mm long, blades 33-48
x 8-14 cm, below the intervals glabrous.
. C. depressa.
39. Pedicels pilose, pilosulous, or finally
glabrate,
40. Pedicels pilose, then glabrate; calyx
10-20 mm long in bud, the lobes unequal,
2-10 mm long, twisted to one side,
caducous; corolla tube glabrous; peduncle
3-14 mm long; stem glabrous.
. C. paludosa, var. paludosa.
40. Pedicels densely appressed brown
pilosulous,
41. Calyx without a beak. . . C. longicalyx.
41. Calyx beaked,
42. Calyx appressed pilosulous through-
out, blades below puberulous; calyx
upper lip 10 mm long. . . . C. fusata.
42. Calyx appressed pilosulous only at
base; blades below appressed pilosu-
lous on the veins. . . . C. imparilis.
37. Peduncles 13-60 mm long; corolla 24-32 mm long;
blades entire or subtire.
. C. grandiflora, var. grandiflora.
36. Corolla pubescent without,
43. Inflorescence and lower leaf surface pruinose;
calyx lobed almost to base into linear lobes.
. C. subumbellata, var. intonsa.
43. Inflorescence and leaves not pruinose,
44. Calyx lobed almost to the base,
45. Calyx subequally lobed; inflorescence densely
hirsute; blades ferruginous hirsute above,
46. Calyx lobes narrowly linear-lanceolate;
upper corolla lobes 2.7 mm long; style and
ovary glabrous; petiole bases perfoliate
connate. C. kaalae.
46. Calyx lobes lanceolate; upper corolla lobes
lobes 5 mm long; style and ovary sparsely
hispid; petioles distinct. . . C. arcuata.
45. Calyx 2-lipped, the lobes linear lanceolate,
sparsely pilose; inflorescence sparsely
ferruginous pilose to glabrate; blades
above glabrous or glabrate. . C. kahukuensis.
44. Calyx lobed not more than 2/3 way to base,
47. Style and ovary pubescent or glandular.
. See Part 3.

Part 3

47. Style and ovary pubescent or glandular,
 48. Ovary and fruit pilose or villous,
 49. Ovary pilose; blades broadly-elliptic or -ovate;
 calyx subequally 5-lobed. C. alnea.
 49. Ovary villous; blades linear oblanceolate, long de-
 current; calyx unequally 3-lobed. C. intravillosa.
 48. Ovary and fruit glandular-puberulous or -atomiferous;
 blades elliptic or broader; calyx not villous within,
 50. Calyx 9-10 mm long; puberulous; corolla 15 mm long,
 puberulous. C. opposita.
 50. Calyx 14-16 mm long, glandular pilose,
 51. Tip of calyx lobes thick fleshy keeled within;
 blades elliptic or ovate-elliptic, subacuminate,
 the margin flattened serrulate; ovary glandular
 atomiferous. C. carinata.
 51. Tip of calyx lobes not keeled; blades broadly
 obovate, abruptly acute, the margin salient
 crenate-serrate, ovary minutely glandular
 puberulous. C. oulophylla.
47. Apex of ovary glabrous,
 52. Calyx lobes deltoid to ovate-deltoid,
 53. Calyx in anthesis white, 14-17 mm long, the lobes
 9 mm long, ovate deltoid; corolla 22 mm long, cymes
 cymes 1-flowered, blades narrowly elliptic, the
 veins below spreading pilosulous. C. Hosakae.
 53. Calyx in anthesis green; corolla 20-28 mm long;
 blades oval to elliptic,
 54. Calyx 21 mm long, the 3 lobes 14 mm long, the
 base deltoid, the tip subulate. C. ovalis.
 54. Calyx 9-12 mm long, the 5 lobes narrowly deltoid
 C. pupukeaensis.
52. Calyx lobes lanceolate,
 55. Blades oval, not or little decurrent; corolla
 twice as long as the calyx. C. alnea.
 55. Blades narrower or cuneate and decurrent at base,
 56. Style pubescent,
 57. Calyx lobes 15-19 mm long; inflorescence
 shaggy brown villous. C. Rockii.
 57. Calyx lobes 5-10 mm long, inflorescence
 subappressed brown pilosulous,
 58. Calyx 17-18 mm long; dried corolla 23-25 mm
 long;
 blades 13-24 cm long, elliptic lanceolate,
 the base long decurrent. C. alata.
 58. Calyx 12-14 mm long; dried corolla 18-22 mm
 long; blades 5-10 cm long, asymmetric, ellip-
 tic to oval, the base cuneate. C. laevis.
56. Style glabrous,
 59. Cymes ascending at 45° , 3-7-flowered,

60. Blades entire,
61. Corolla 28 mm long, the tube 20 mm long; calyx lobed 1/2 way, the 5 lobes 7-8 mm long; blades 8-9.8 cm wide, chartaceous. C. ferrea.
61. Corolla 18-20 mm long, the tube 15-17 mm long; calyx lobed 2/5 way, the 4 lobes 5.5-7 mm long; blades 5-8.8 cm wide, membranous. C. scapiflora.
60. Blades toothed,
62. Calyx lobed 2/3 way, 19 mm long, ascending puberulent; lower lobes lanceolate with subulate tips; corolla 27 mm long, pilose; blades 18-22 x 8.4-10.7 cm, oval, acuminate. C. tantalusensis.
62. Calyx lobed 1/2 way,
63. Calyx 11-12 cm long, pilosulous, the lobes 6-7 mm long; cymes axillary, 3-4-flowered; blades 8.5-20 x 3.5-9.2 cm, the base connate. C. pilosicalycis.
63. Calyx 16-21 mm long,
64. Calyx lobes puberulous; cymes cauliflorous, 7-16-flowered; blades 24-40 x 8.5-11.5 cm, the base decurrent. C. glabriflora.
64. Calyx lobes pilosulous,
65. Cymes axillary, 1-3-flowered; blades 6-15 x 2.4-6 cm, elliptic or oblanceolate; calyx 20-21 mm long, the lobes 11 mm long. C. Bishopii.
65. Cymes 3-5-flowered; calyx 16 mm long, the lobes 5-6 mm long, linear lanceolate; blades 6-17 x 2-4.5 cm, narrowly elliptic or oblanceolate. C. turbiniformis.
59. Cymes reflexed, 1-3-flowered; floral bracts 1-3 mm long, lanceolate, densely brown appressed pilose; blades glabrate above,
66. Calyx 17 mm long, appressed brown pilose; leaf scars connate. C. olivacea.
66. Calyx 25-27 mm long, glabrate; leaf scars separate. C. megistocalyx.

Section 2, subgenus Brachycyathes

Part 4 (Calyx campanulate, persistent)

67. Peduncles and pedicels glabrous, glabrate, or pruinose,
68. Corolla villous; style glabrous; inflorescence sparsely pubescent, but soon glabrate,
69. Leaves subcoriaceous, deeply impressed rugose,

- densely appressed sericeous pilosulous beneath; cymes 7-10-flowered; calyx tube 1-3 mm long, short funnellform, the lobes glabrous. . . . C. polyantha.
69. Leaves firm chartaceous, when mature sparsely appressed pilosulous on veins, elsewhere glabrate beneath; cymes 4-8-flowered; calyx tube 4-7.5 mm long, campanulate, the lobes sparsely pilosulous, finally glabrate. C. ambigua.
68. Corolla pruinose without, especially in bud; style pruinose or puberulous; inflorescence pruinose,
70. Flowers solitary; calyx 12-21 mm long, lobed almost to base into broadly lanceolate lobes; blades puberulent beneath; petiole bases perfoliate; leaf scars annular. . . . C. pruinosa.
70. Flowers in cymes; calyx lobes linear or narrowly lance linear,
71. Calyx 2-4 mm long; corolla 10-12 mm long; pedicels 6-12 mm long; blades pruinose below and the veins pilosulous; petiole bases perfoliate; leaf scars annular. C. Macraei.
71. Calyx 8-36 mm long; corolla 23-25 mm long, pedicels 1-7.5 cm long; petioles not perfoliate,
72. Blades serrate, puberulent beneath, peduncles 8-17 mm long; pedicels 10-50 mm long,
73. Blades lanceolate, gradually long acuminate, below subglabrate; peduncular bracts 14-17 mm long; calyx 22-36 mm long; corolla pruinose. C. gracilis.
73. Blades broadly oval, abruptly short acuminate, below capitate glandular puberulent; peduncular bracts 5-7 mm long; calyx 14-15 mm long; corolla glandular puberulent. C. linearis.
72. Blades crenate or double crenate; peduncles 5-10 mm long; pedicels 5-25 mm long,
74. Blades pruinose beneath, the veins pruinose or sparsely minutely appressed puberulent; corolla lobes sparsely glandular puberulent within. C. subumbellata, var. subumbellata.
74. Blades with veins and veinlets below spreading puberulent. var. intonsa.
67. Peduncles and pedicels markedly pubescent,
75. Blades all cordate (or only a few rounded) at base,
76. Ovary and fruit pubescent,
77. Calyx cleft to the middle into lanceolate or lance-ovate lobes, 9-21 mm long; ovary and fruit densely villous or pilose,
78. Plant shaggy villous; blades dentate; ovary villous; calyx accrescent. C. cordifolia, var. cordifolia.

78. Plant pilose,
 79. Blades subentire; ovary glabrous towards the base; calyx accrescent. var. brevipilata.
 79. Blades serrulate; ovary pilosulous; calyx not accrescent, not reflexed in fruit,
 80. Upper calyx lobes lanceolate; corolla pilose without; blades with intervals below sparsely pilosulous. C. subcordata.
 80. Upper calyx lobes broadly deltoid,
 81. Corolla pilose without; blade intervals below essentially glabrous; blade margins apiculate, serrate or doubly so. C. Pearsallii.
 81. Corolla shaggy villous without, blade intervals below pilosulous, the margins low serrulate. C. villosiflora.
 77. Calyx cleft to the base into lanceolate, acuminate lobes; ovary and fruit puberulent,
 82. Calyx 9 mm long; the upper lobe 4-5 mm long; branchlets glabrate. C. pukeleensis.
 82. Calyx 13-30 mm long; branchlets villous,
 83. Calyx 13-14 mm long, the upper lobes 13-14 mm long; cymes villous; blades above sparsely appressed puberulous. C. villifera.
 83. Calyx 15-30 mm long, the upper lobes 8-10 mm long; cymes glandular villous; blades above catenulate villous. C. villicalyx, var. pubigentigyna.
 76. Ovary glabrous; fruit glabrous (except in C. leucocalyx),
 84. Calyx 10-40 mm long, split to the base into linear lanceolate lobes,
 85. Calyx after anthesis diverging, then reflexed,
 86. Calyx 20-25 mm long; corolla decurved at middle at about 40°; berry glabrous. C. propinqua.
 86. Calyx in anthesis 16-17 mm long,
 87. Calyx lobes lanceolate; corolla 23-24 mm long; cymes villous; blades 8-17.5 x 5-12.3 cm, broadly ovate, above villous. C. leucocalyx.
 87. Calyx lobes linear lanceolate; corolla 18 mm long; cymes pilose; blades 20.5-24 x 13.5-16 cm, elliptic, above pilosulous. C. biformalis.
 85. Calyx lobes spreading or at most rotate in fruit; calyx 15-25 mm long, but in fruit accrescent and up to 40 mm long, the base broadly funnelform, the lobes lanceolate. C. villicalyx.

84. Calyx 10-12 mm long, divided only to the middle into deltoid, ascending lobes; blades densely villous; corolla lobes green. . . C. viridiflora.
75. Blades rounded, cuneate, or decurrent at base,
88. Petiole bases broadly perfoliate and connate around the node; leaf scars annular, encircling the stems,
89. Leaves sessile or subsessile, winged to the petiole base; upper leaf surface hirsute; corolla tube included in the calyx; calyx lobes 8-13 mm long,
90. Calyx lobes 1 mm wide, linear; ovary glabrous. C. charadraia.
90. Calyx lobes 2.3 mm wide, narrowing linear lanceolate; ovary hirsutulous. . . C. tristis.
89. Leaves petioled; upper surface scabrous hispid or hirsute; corolla exserted,
91. Calyx lobes linear or slightly lance linear or narrowly ligulate; style pubescent,
92. Calyx supappressed puberulent and the blades above sparsely so; calyx 9-11 mm long, the lobes lance-linear. C. kahanaensis.
92. Calyx and blades above hirsute or hispid, calyx 14-20 mm long,
93. Calyx lobes narrowly ligulate, acute, sparsely hirsute to subglabrate; blades below capitate glandular puberulent on intervals. C. axilliflora.
93. Calyx lobes very narrowly lance-linear, densely villous; blades hirsute below,
94. Blades 8-30 cm long, subacuminate; secondary veins 7-10 on a side; filaments adnate to the corolla tube to within 4 mm of the throat. C. coralliflora.
94. Blades 2-13 cm long, acuminate; secondary veins 5-8 on a side; filaments adnate to the corolla tube to within 9 mm of the throat. . . C. waiolani, var. waiolani.
91. Calyx lobes lanceolate, linear lanceolate or narrowly elliptic,
95. Style ovary, and fruit glabrous,
96. Corolla 25 mm long; blade margins unevenly serrulate; calyx 19-21 mm long, campanulate C. partita.
96. Corolla 20 mm long; blade margins denticulate; calyx tube funnellform,
97. Calyx 14-19 mm long, subappressed hirsute, the lobes 12-15 mm long, linear lanceolate; blades 7-15 x 3-7.8 cm, below pilose. C. kaalae.

97. Calyx 13-15 mm long, densely pilose, the lobes 8-10 mm long, lanceolate, blades 17.5-25 x 10-14.5 cm, below minutely appressed, puberulous. . . C. ovalifolia.
95. Style pubescent,
98. Fruit glabrous,
99. Calyx hirsute or hirsutulous,
100. Calyx densely rough hirsute, the lobes lance elliptic; blades hirsute below; corolla tube hirsute without. C. kalichii.
100. Calyx hirsutulous, the lobes narrowly lanceolate, blades pilose below; corolla tube villous without. C. kaneoheensis.
99. Calyx subappressed pilose without. C. Fosbergii.
98. Fruit pilose.
101. Calyx lobes 8 mm long, densely villous, lance ovate; blades 21-30 x 12.5-19 cm, oval suborbicular, below pilose. C. pubens.
101. Calyx lobes 9-13 mm long, not villous,
102. Calyx lobes 10-13 mm long, narrowly elliptic oblanceolate, pilose; corolla 18-22 mm long, villous; blades oval, acute, below viscid pilose. C. Forbesii.
102. Calyx lobes 9-10 mm long, puberulous, corolla 16 mm long, pilose; blades oblanceolate (or elliptic), below glabrous. C. discors.
88. Petiole bases not perfoliate, but separate as are the leaf scars.
103. Cymes cauliflorous, often to the stem base; calyx whitish, lobed 2/3 to 3/4 way, the lobes lance oblong or linear lanceolate, accrescent,
104. Calyx spreading pubescent,
105. Calyx 5-7.5 mm long, the lobes lance-linear; style pilose; berry puberulent; ovary puberulent. C. stupantha.
105. Calyx 13-16 mm long, the lobes broadly lanceolate, ovary and style glabrous. C. prorsiflora.
104. Calyx appressed or subappressed puberulent,
106. Style glabrous; blades chartaceous, above remotely appressed pustulate hirsutulous; veins below moderately appressed puberulent; calyx 5-8 mm long, puberulent. C. adpressipilosa.

106. Style pilose; blades firm chartaceous, above appressed pustulate puberulent; calyx 7-10 mm long. . . . C. kailuaensis.
103. Cymes axillary,
107. Calyx loose, not closely enclosing the corolla at base, and white or whitish, parted almost to the base.
108. Calyx lobes lanceolate or ovate, the margins commonly revolute; blades ovate or narrower, cuneate,
109. Calyx lobe margins not revolute,
110. Ovary and fruit villous; style none. . . . C. poamoensis.
110. Ovary and fruit puberulous; style slender, above 4 mm long. . . . C. leucocalyx.
109. Calyx lobe margins revolute; ovary glabrous or sparsely hirsute,
111. Blades tomentose only on midrib and veins. C. Lessoniana, var. angustifolia.
111. Blades below pubescent throughout; style none,
112. Blades closely appressed pilose sericeous beneath, lanceolate or lance-ovate, short acuminate; calyx lobes glabrous within. var. Lessoniana.
112. Blades semiappressed or spreading puberulent beneath,
113. Calyx lobes glabrous within,
114. Blades oblanceolate (rarely lanceolate), 3-22 x 1.2-5.2 cm; calyx 13-22 mm long. var. koolauloensis.
114. Blades lance-elliptic, 3.5-6.1 x 1.3-2.2 cm, the lobes 2.3-3.8 mm wide; corolla 17 mm long. C. elliptisepala.
113. Calyx lobes appressed puberulent within. C. Lessoniana, var. intrapubens.
108. Calyx lobes narrowly lanceolate (or oblanceolate), pilose within, plane; blades broadly oval to suborbicular, rounded at base. C. propinqua.
107. Calyx closely enclosing the base of the corolla and ascending, green or the tissue green with white or ferruginous pubescence, (or in C. Garnotiana whitish on flower but green in fruit), or if white, lobed 3/4 way or less. See Part 5.

Part 5

115. Calyx lobes linear or very narrowly lance-linear,
 116. Inflorescence appressed pilosulous; peduncles 1-11 mm long,
 117. Calyx lobed 1/2-2/3 way, densely ferrugineous appressed pilose; leaves in whorls of 3. C. crenata.
 117. Calyx lobed to the base, sparsely appressed hirsutulous, leaves opposite. C. koolauensis.
 116. Inflorescence with spreading hairs,
 118. Inflorescence puberulent; calyx lobes glabrous within; berry pruinose. C. kahanaensis.
 118. Inflorescence hirsute or villous; calyx lobes almost hidden by dense coarse hirsute pubescence; berry glabrous; blades beneath hirsute, sparsely hirsute on veins, remotely so on the intervals.
 119. Flower 1 (-2) on the peduncle,
 120. Style glabrous; pedicels 3-8 mm long; blades 9-39 mm wide, firm chartaceous. C. oahuensis.
 120. Style pilose; pedicels 5-22 mm long; blades 12-56 mm wide, thin chartaceous. C. waiolani, var. waiolani.
 119. Flowers 5-7 and subcapitate on the peduncle. var. capitata.
 115. Calyx lobes lanceolate, deltoid, or broader,
 121. Calyx 6-11 mm long, lobed to about the middle, the lobes narrowly deltoid or lance-ovate, or lanceolate,
 122. Style pilosulous. C. villosa.
 122. Style glabrous or none,
 123. Calyx lobes lanceolate or linear lanceolate,
 124. Calyx lobes lanceolate, cymes 3-5-flowered, pilosulous; petioles pilosulous; blade margins serrate, the base decurrent,
 125. Tip of calyx lobe subulate; corolla 25 mm long; blade margins serrate, the base decurrent. C. haikuensis.
 125. Tip of calyx lobe not subulate, cymes hirsutulous; corolla 16 mm long; blades deltoid denticulate, the base connate. C. kamooaluensis.
 124. Calyx lobes linear-lanceolate, cymes 7-16-flowered, puberulent; petioles puberulent; blade margins doubly serrulate. C. kailuaensis.
 123. Calyx lobes narrowly deltoid-lanceolate, style none (or 1.5 mm long),
 126. Berry and young ovary glabrous,
 127. Blades firm chartaceous; calyx campanulate, the lobes narrowly deltoid. C. rivularis.

127. Blades coriaceous; calyx cupulate, the lobes broadly deltoid. . . C. cupuliformis.
126. Berry puberulent, though the ovary glabrous,
128. Calyx densely spreading pilosulous,
129. Blades 7-23 x 4-11.5 cm, above sparsely puberulent, below pilosulous, mostly elliptic to lanceolate; flowers 3-20 in a lax dichotomous cyme. . . C. Garnotiana.
129. Blades 3-15 x 1.6-5 cm, above closely pilosulous, below densely canescent pilosulous, mostly ovate to ovoid, acute; peduncle 1-3-flowered.
. C. sandwicensis.
128. Calyx sparsely subappressed puberulent, the lobes narrowly deltoid; blades tapering to both ends and cuneate decurrent at base, above appressed hirsute. C. intonsa.
121. Calyx mostly longer or more deeply lobed or the lobes lanceolate or broader. See Part 6.

Part 6

130. Calyx lobes lance-ovate or broader,
131. Calyx lobes ovate-suborbicular, acute; blades villous beneath. C. Pickeringii.
131. Calyx lobes narrower,
132. Blades below and petioles appressed puberulent; calyx 22 mm long. C. scabrella.
132. Blades below and petioles pilosulous; calyx 9-18 mm long.
133. Calyx lobes obtuse,
134. Calyx campanulate, 12-13 mm long, blades hirsute above. C. kaluanuiensis.
134. Calyx broadly crateriform,
135. Calyx 9-10.5 mm long, 1/2 as long as the corolla tube; style none; blade margins low serrulate, but the teeth almost concealed by dense villosity. C. niuensis.
135. Calyx 13-16 mm long, equaling or 2/3 as long as the corolla tube; style present; blades above appressed puberulent; corolla 25 mm long; petioles ascending pilosulous; blade margins evidently serrate or crenate,
136. Corolla lobes sparsely villosulous within; corolla tube cylindrical; style hirsute; blades chartaceous, shallowly undulate serrate, acute. C. Skottsbergii.
136. Corolla lobes glabrous within; corolla tube ovoid subglobose; style glabrous; blades thick firm chartaceous, coarsely crenate subacuminate. . . C. grossecrenata.

133. Calyx lobes acute,
 137. Calyx reflexed in fruit, lobed 2/3 way to base
 C. waianaeensis.
137. Calyx not reflexed,
 138. Calyx lobes broadly ovate-deltoid or
 deltoid,
 139. Calyx 20-23 mm long; blade base cuneate or
 rounded; blade pilose above.
 C. paloloensis.
139. Calyx 11-18 mm long,
 140. Calyx 11-14 mm long, pilose, the lobes
 broadly deltoid; corolla pilose; blades
 5-16 x 2.8-11.1 cm, broadly elliptic
 subcordate, below the intervals
 subglabrous; petioles pilose; branchlets
 pilose. C. Pearsallii.
140. Calyx 14-18 mm long,
 141. Calyx 14-16 mm long, villous,
 especially at base, the lobes ovate
 with a subulate tip; corolla villous;
 blades 17.5-19.5 x 11.2 - 14 cm,
 broadly ovate, the base rounded, below
 the intervals hirsutulous.
 C. subaequalis.
141. Calyx 17-18 mm long, pilose,
 142. The 5 calyx lobes deltoid; 1-12 mm
 long; corolla pilose; blades
 15-19.5 x 15-17.5 cm, semiobicular,
 below the intervals pilosulous.
 C. rotundata.
142. The 4 calyx lobes 5-6 mm long;
 corolla 15 mm long, pilose.
 C. acuminifolia.
138. Calyx lobes lance-ovate,
 143. Blades elliptic or broadly oval to
 suborbicular; calyx lobed 1/2 way to base,
 144. Calyx crateriform,
 145. Ovary and style glabrous; corolla tube
 much inflated, ovoid subglobose.
 C. grossecrenata.
145. Ovary and style pubescent,
 146. Peduncle and petioles shaggy
 villous; blades oval, acute, mostly
 rounded at base. C. honoluluensis.
146. Peduncle and petioles moderately
 villosulous or pilose; blades ellip-
 tic to oval, acute, the base cuneate
 to decurrent. C. kipapaensis.
144. Calyx funnellform, moderately villosulous
 or pilose; peduncles and petioles

- moderately villosulous or pilose;
 blades elliptic to oval, acute, the
 base cuneate to decurrent,
147. Calyx 8-15 mm long,
148. Ovary glandular pilose,
149. Calyx lobes not equaling the
 corolla tube, not becoming revo-
 lute; blade margins low serru-
 late, calyx cleft 1/2-2/5 way to
 base. C. villosiflora.
149. Calyx lobes equalling the corolla
 tube, but in fruit revolute; blade
 margins sharply dentate; calyx
 cleft 4/5 way to base.
 C. Frederickii.
148. Ovary glabrous; calyx lobes villous,
 not revolute, much exceeded by the
 corolla tube; blade margins
 shallowly undulate serrate.
 C. Skottsbergii.
147. Calyx 13-20 mm long.
150. Calyx tube 12-13 mm long, ascending
 white pilose, the lower lobes del-
 toid ovate, corolla 28-30 mm long;
 cymes ascending pilosulous; pedicels
 8-10 mm long; branchlets brownish
 pilose; petioles brownish ascending
 pilose; blade base cuneate and
 decurrent, below the surface sparse-
 ly pilosulous. C. ferruginosa.
150. Calyx tube 8 mm long, ascending
 brown puberulous, the lower lobe
 lanceolate, corolla 21 mm long; cyme
 ascending brown puberulous; pedicels
 4.5-9 mm long; branchlets ascending
 puberulous; petioles brown
 appressed puberulous; blade base
 slenderly cuneate, below the surface
 glabrous. C. cuspidata.
143. Blades elliptic or oblance-elliptic; calyx
 lobed 3/5 to 5/6 way to base,
151. Calyx lobed 3/5-2/3 way to base, 11-18
 mm long; ovary and style glabrous,
152. Bundle scars 5; blades 8-11.5 cm
 long, subentire; calyx 18 mm long,
 narrowly campanulate, salient ridged,
 the lobes 6 mm wide. C. subintegra.
152. Bundle scars 9; blades 11-18.5 cm
 long, low serrulate; calyx 11 mm long,
 campanulate, the base subtruncate, the

- lobes 3-3.8 mm wide. C. infrapallida.
151. Calyx lobed 5/6 way to base; young shoots and petioles densely subappressed ferruginous villous, the villosity persisting on the branches,
153. Ovary and fruit villous above; calyx within sparsely hirsutulous; blades below subappressed viscid pilose, the veins prominent. C. Bryanii.
153. Ovary and fruit glabrous,
154. Calyx glabrous within, 8-10 mm long, style glabrous; blades below with dense appressed villosity, concealing the veins. C. niuensis.
154. Calyx pilose within, 16-17 mm long; style none; stigmas glandular villous; blades below softly appressed pilosulous, the veins salient, prominent. C. intrapilosa.
130. Calyx lobes lanceolate or elliptic.
155. Berry pubescent,
156. Blades rounded at base (or rarely a few of them cuneate); calyx lobed nearly to the base,
157. Calyx lower lobes deltoid,
158. Calyx 18 mm long, the lower lobes deltoid and subulate tipped; corolla 19 mm long, the tube 15 mm long, upper lobes 2.5 mm long; lower lobes 4.5 x 5 mm ovate; branches pilose, blades elliptic, below glabrous, the margins serrate. C. piaensis.
158. Calyx 20-23 mm long, the lobes deltoid; corolla 25-27 mm long, the tube 18-19 mm long, the upper lobes 5 mm long, lower lobe 5 x 9 mm, suborbicular; branches villous, blades ovate or obovate acuminate, below pilose, the margins shallowly denticulate. C. paloloensis.
157. Calyx lobes narrowly lanceolate, about 2/3 as long as the corolla tube, reflexed in fruit, persistent,
159. Ovary puberulous in upper half; style glabrous,
160. Calyx 12-13 mm long, the lobes 8-12 mm long, ligulate lanceolate and subulate tipped; corolla 17 mm long, pilosulous. C. quinqueflora.
160. Calyx 16-17 mm long, the lobes 13-14 mm long, lanceolate; corolla 23-24 mm long, glandular puberulous. C. leucocalyx.
159. Ovary and style densely pilose,
161. Calyx 8-15 mm long, nearly equaling the

- corolla; style persistent as a beak.
 *C. Frederickii*.
161. Calyx in anthesis 11-18 mm long, about 1/2
 as long as the corolla, style scarcely
 evident, deciduous. *C. reflexa*.
156. Blades cuneate at base or if rounded the calyx
 lobed 1/2 to 4/5 way to base,
162. Calyx lobed 1/2 way; ovary glabrous.
 *C. laxiflora*.
162. Calyx lobed 2/3 way or more,
163. Calyx lobed 2/3 -4/5 way to base,
164. Calyx lobes linear lanceolate; blades nar-
 rowly oblanceolate or elliptic, chartaceous,
165. Petioles with spreading hairs,
166. Petioles pilose; blades oval, acuminate,
 below minutely appressed puberulous, the
 veins pilosulous; calyx (dried) 10-14 mm
 long, the tube 5 mm long, the lobes
 lanceolate and subulate, corolla 19 mm
 long. *C. trionanthe*.
166. Petioles puberulent, blades elliptic
 oblanceolate, acute, or subacuminate,
 below the surface densely puberulous,
 the principal veins shaggy puberulent;
 calyx (dried) 7-9 mm long, the tube
 2-2.5 mm long, the lobes linear
 lanceolate; corolla 9-12 mm long,
 hirsute. *C. kailuaensis*.
165. Petioles and inflorescence appressed
 pubescent,
167. Calyx (dried) in anthesis 5-8 mm long;
 corolla tube moderately hirsutulous;
 blades above remotely appressed pustule
 hirsutulous. *C. adpressipilosa*.
167. Calyx (dried) in anthesis 11-14 mm long;
 corolla tube hidden by its dense
 villosity; blades above appressed
 pilosulous. *C. Christophersenii*.
164. Calyx lobes broadly lanceolate; ovary
 pubescent; blades oval or elliptic,
168. Blades elliptic,
169. Calyx 14-15 mm long, the tube 2-3 mm
 long; corolla 28 mm long, shaggy
 villous; cymes 3-flowered; peduncle
 21-28 mm long. *C. Mannii*.
169. Calyx tube 2-6 mm long; corolla 11-25 mm
 long,
170. Corolla 25 mm long, pilosulous; calyx
 14-17 mm long; cymes 4-7-flowered;
 peduncle 14-20 mm long; blades below

with the surface appressed puberulous

. C. subrubra.

170. Corolla 11 mm long, hirsutulous; calyx 10-12 mm long; cymes 5-9-flowered; peduncle 5-6 cm long; blades below appressed hirsutulous. C. catenulata.

168. Blades oval or subcordate,

171. Blades oval, 5.5-9.5 cm long; petioles 16-20 mm long; ovary densely villous; corolla 20 mm long; calyx 11-13 mm long C. crassior.

171. Blades unevenly subcordate or rounded at base, 10-17 cm long; petioles 5-12 cm. long; ovary tip sparsely pilose. C. piligyna.

163. Calyx lobed almost to the base

172. Calyx lobes widest near the middle, spreading white hirsutulous or white pilose; petioles shaggy villous or pilose. C. dentata.

172. Calyx lobes widest near the base,

173. Style none; berry densely villous; blades elliptic-lanceolate to oval, the margins serrate. C. poamohoensis.

173. Style slender; berry glandular puberulous; blades broadly oval, the margins dentate,

174. Style pilose,

175. Calyx ascending pilose, 8-9 mm long, the lobes lanceolate, 6 mm long, corolla 16 mm long; blades acuminate, above appressed puberulous, below puberulous. C. wailupeensis.

175. Calyx glandular pilose, 9-14 mm long, the lobes lanceolate, 7-10 mm long; corolla 23 mm long; blades acute, above hirsute, below pilose. C. dentata.

174. Style glabrous; calyx in anthesis 16-17 mm long, the lobes acuminate; corolla tube puberulous. C. leucocalyx.

155. Berry glabrous (or in C. oulophylla with a few hairs near the apex; blades cuneate at base,

176. Style glabrous,

177. Calyx in anthesis parted about 1/2 way,

178. Calyx 7-9 mm long; blades oval, elliptic, or obovate,

179. Blades 49-72 mm wide, above sparsely appressed hirsute; calyx in anthesis funnelform. C. stupantha.

179. Blades 19-41 mm wide, above pilosulous; calyx in anthesis campanulate. C. Vanioti.

178. Calyx 8-22 mm long,
 180. Calyx 20-22 mm long,
 181. Calyx pilose, the lobes lanceolate
 acuminate; cyme 5-10 cm long,
 1-3-flowered, densely brown pilose; blades
 oval, acuminate, the base rounded or
 unequally abruptly cuneate, above
 appressed pilosulous, below appressed
 puberulous, but the principal veins pilose
 C. basirotundata.
181. Calyx capitate, glandular pilosulous,
 cymes 1.8-4 cm long; 3-5-flowered, sub-
 glabrous; blades elliptic or broadly so,
 acute or shortly acuminate, the base
 shortly cuneate, above glabrous, except
 for the sparsely pilosulous midrib, below
 pilosulous on the veins. C. campaniformis.
180. Calyx 8-14 mm long; blades narrowly
 elliptic, oblanceolate or obovate,
 182. Upper calyx lobes narrowly deltoid; calyx
 surface obscured by the dense glandular
 spreading pilosity; exposed corolla tube
 shaggy villous; blades 2.8-6.3 cm long,
 above densely pilose. . . . C. rivularis.
182. Upper calyx lobes not deltoid,
 183. Upper calyx lobes lanceolate; calyx
 ascending puberulous; corolla tube 15 mm
 long, puberulous; pedicels 8 mm long;
 blade 10-27 x 7.5-12.6 cm, oval, cuneate
 and decurrent, below appressed
 puberulous. C. kremnes.
183. Upper calyx lobes with broad linear
 tips; calyx surface finely appressed
 pilosulous; corolla tube glabrous on
 lower 2/3; blades 6.8-12.2 cm long,
 elliptic or elliptic-oblanceolate, the
 base cuneate, below the intervals
 glabrous. C. triflora.
177. Calyx in anthesis parted 2/3 way or more,
 184. Calyx 3-lobed. C. oulophylla.
184. Calyx 5-lobed,
 185. Calyx strongly 2-lipped.
 186. Calyx 32-36 mm long; densely appressed
 villous. C. Rockii.
186. Calyx 45 mm long, hirsute.
 C. caudatisepala.
185. Calyx almost equally 5-lobed,
 187. Blades glabrous above, 9-16 mm wide. . . .
 C. hirsutula.
187. Blades appressed pubescent above, 10-61 mm
 wide,

188. Calyx 8-16 mm long,
 189. Calyx 10-16 mm long;
 190. Blades coriaceous, the base abruptly
 cuneate; calyx 9-12 mm long,
 appressed pilose. C. Wilderi.
 190. Blades chartaceous, the base
 cuneate,
 191. Calyx 13-16 mm long, spreading
 pilose. C. prorsiflora.
 191. Calyx 11-13 mm long, puberulent. .
 C. dasygyna.
 189. Calyx 8-10 mm long, the lobes
 elliptic, with the lower half hirsut-
 ulous, the upper half puberulous;
 cymes 1-flowered; pedicels 7-12 mm
 long; ovary glabrous; pedicels 7-11
 mm long, hirsute; blades 3.5-6.1 x
 1.3-2.2 cm, above hirsute.
 C. elliptisepala.
 188. Calyx 20-25 mm long,
 192. Calyx lobes ovate, obtuse, appressed
 pilose, base of blade long cuneate. .
 C. longiloba.
 192. Calyx lobes linear lanceolate,
 villous; blades oval to suborbicular.
 C. propinqua.
 176. Style pubescent,
 193. Calyx cleft half way to base, sparsely appressed
 puberulent,
 194. Calyx 33-36 mm long; corolla 33-35 mm long;
 blade 15-18 cm long. C. triados.
 194. Calyx 22 mm long; corolla 29 mm long; blades
 7.5-12.5 cm long. C. scabrella.
 193. Calyx cleft 3/5 way or more,
 195. Calyx cleft 3/5 way; blades oblanceolate;
 corolla tube deflexed at 35° at the middle,
 shorter than the calyx; calyx lobes lance
 linear. C. ferrocatorata.
 195. Calyx cleft nearly to the base,
 196. Blades long decurrent, calyx lobes
 subglabrous at tip. C. chartacea.
 196. Blades cuneate,
 197. Calyx lobes narrowly elliptic-
 oblanceolate; blade base abruptly cuneate
 C. Forbesii.
 197. Calyx lobes lanceolate or linear
 lanceolate,
 198. Calyx glabrous within, equaling the
 corolla, the lobes lanceolate.
 C. arcuata.

198. Calyx pubescent within,
199. Calyx 9-13 mm long, shaggy pilose
without, the lobes broadly lanceolate,
4-5 mm broad. C. opaeulae.
199. Calyx 13-18 mm long, hirsute, the
lobes linear lanceolate, 2.5-3 mm
broad. C. basipartita.

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